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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,932	11/14/2003	Cha Deok Dong	P68322US1	7432
136	7590	03/11/2004	EXAMINER	
JACOBSON HOLMAN PLLC 400 SEVENTH STREET N.W. SUITE 600 WASHINGTON, DC 20004			CHEN, JACK S J	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 03/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/706,932	Applicant(s) DONG ET AL.	
	Examiner Jack Chen	Art Unit 2813	<i>AW</i>

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 11 and 12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1, 11 and 12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 10/287,785.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

In response to the communication filed on November 14, 2003, claims 1, 11-12 are active in this application.

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 10/287,785, filed on 11/05/02.

Oath/Declaration

Oath/Declaration filed on November 14, 2003 has been considered.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the (Re claim 1, lines 9-10) phrase "then performing an etch process by which given portions of the trench insulating film are protruded" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

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The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Re claim 12, the phrase "the pre-treatment cleaning process is performed using DHF and SC-1 or BOE and SC-1" is not supported by the specification.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1, 11-12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Re claim 1, lines 9-10, the phrase "removing the pad nitride and **then** performing an etch process by which given portions of the trench insulating film are protruded" is not supported by the specification.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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8. Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 12, the phrase “the pre-treatment cleaning process is performed using DHF and SC-1 or BOE and SC-1” is not supported by the specification.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Kang et al., U.S. Pub. No. 2002/0072197 A1.

Kang et al. Disclose a method for manufacturing a flash memory cell, which comprises sequentially forming a tunnel oxide film 202, a first polysilicon layer 204 and a pad nitride film 206 on a semiconductor substrate 200 (fig. 4A, paragraph 0059; also see fig. 3A, paragraph 0037); forming a trench 208 at the semiconductor substrate (fig. 4A); forming a trench insulating film 214 by which the trench is buried and then performing a chemical mechanical polishing (CMP) process to isolate the trench insulating film (fig. 4D, paragraph 0068); removing the pad nitride film and then performing an etch process by which given portions of the trench insulating film are protruded (fig. 4D, paragraph 0069; also see paragraph 0050); depositing a second polysilicon layer 216 (fig. 4E) on the entire structure and then patterning the second polysilicon

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layer to form a floating gate (fig. 4E); and forming a dielectric film 218 and a control gate 230 on the floating gate, see figs. 1A-5G, page 1-11 for more details.

Re claim 11, further comprising the step of after the trench is formed, forming a pre-treatment cleaning process in order to etch the tunnel oxide film by a desired thickness (fig. 4A, paragraph 0061).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al., U.S. Pub. No. 2002/0072197 A1 in view of Jung, U.S./6,599,792 B2.

Kang et al. Disclose above and in particular, *paragraph 0061 teaches using any chemical that having a high selectivity to the silicon and using wet etching method for removing the tunnel oxide*; however, Kang et al. is silent to using DHF and SC-1 or BOE and SC-1 as the etchant for

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oxide. It should be noted that using DHF or BOE for removing oxide is well known in the art.

For example, Jung teaches a method for forming a semiconductor device, which comprises using BOE and SC-1 as the etchant for oxide 120 (figs. 2B-2C; col. 4, lines 35-48).

Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to select any suitable etchant such as BOE and SC-1 as the etchant for oxide as taught by Jung in the method of Kang et al. in order to selectively etched the oxide.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

16. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura et al., U.S./6,222,225 B1 in view of Koh, U.S./6,391,722 B1.

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Nakamura et al. disclose a method for manufacturing a flash memory cell, which comprises sequentially forming a tunnel oxide film 15, a first polysilicon layer 16a and a pad nitride film 31 on a semiconductor substrate 11 (fig. 5A, also see fig. 9A); forming a trench 13 at the semiconductor substrate (fig. 5B); forming a trench insulating film 14 by which the trench is buried (fig. 5C) and then performing a chemical mechanical polishing (CMP) process to isolate the trench insulating film (fig. 5D); removing the pad nitride film (fig. 5E) and then performing an etch process by which given portions of the trench insulating film are protruded (fig. 5F); depositing a second polysilicon layer on the entire structure and then patterning the second polysilicon layer to form a floating gate 16b (fig. 5G, called "second gate electrode"); and forming a dielectric film 17 and a control gate 18 (fig. 5H) on the floating gate, see figs. 1A-9I, cols. 1-10 for more details.

Nakamura et al. Disclosed above ; however, Nakamura et al. are silent to using polysilicon for the second gate electrode.

Koh teaches a method for forming a semiconductor device, which comprises forming first polysilicon layer 104 on the substrate 100 (fig. 1); forming the second polysilicon layer 116 on the first polysilicon layer (fig. 5, note: the floating gate comprises first and second polysilicon layers), see figs. 1-7, cols. 1-6 for more details.


Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to using polysilicon for the second gate electrode as taught by Koh in the method of Nakamura et al. in order to provide a desired sheet resistance for the floating gate and high capacitive coupling ratio.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Chen whose telephone number is (571)272-1689. The examiner can normally be reached on Monday-Friday (9:00am-6:30pm) alternate Monday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W Whitehead can be reached on (571)272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Jack Chen
Primary Examiner
Art Unit 2813